SNO+ experiment

Jarek Kaspar
for SNO+ collaboration

SNO+ collaboration

Armstrong Atlantic State University
Black Hills State University
Brookhaven National Laboratory
University of California – Berkeley &
Lawrence Berkeley National Laboratory
University of Chicago
UNC at Chapel Hill
University of Pennsylvania
University of Washington

LIP Coimbra
LIP Lisboa

Oxford University
Queen Mary, University of London
University of Liverpool
University of Sussex

Laurentian University
Queen's University
SNOLAB
TRIUMF
University of Alberta

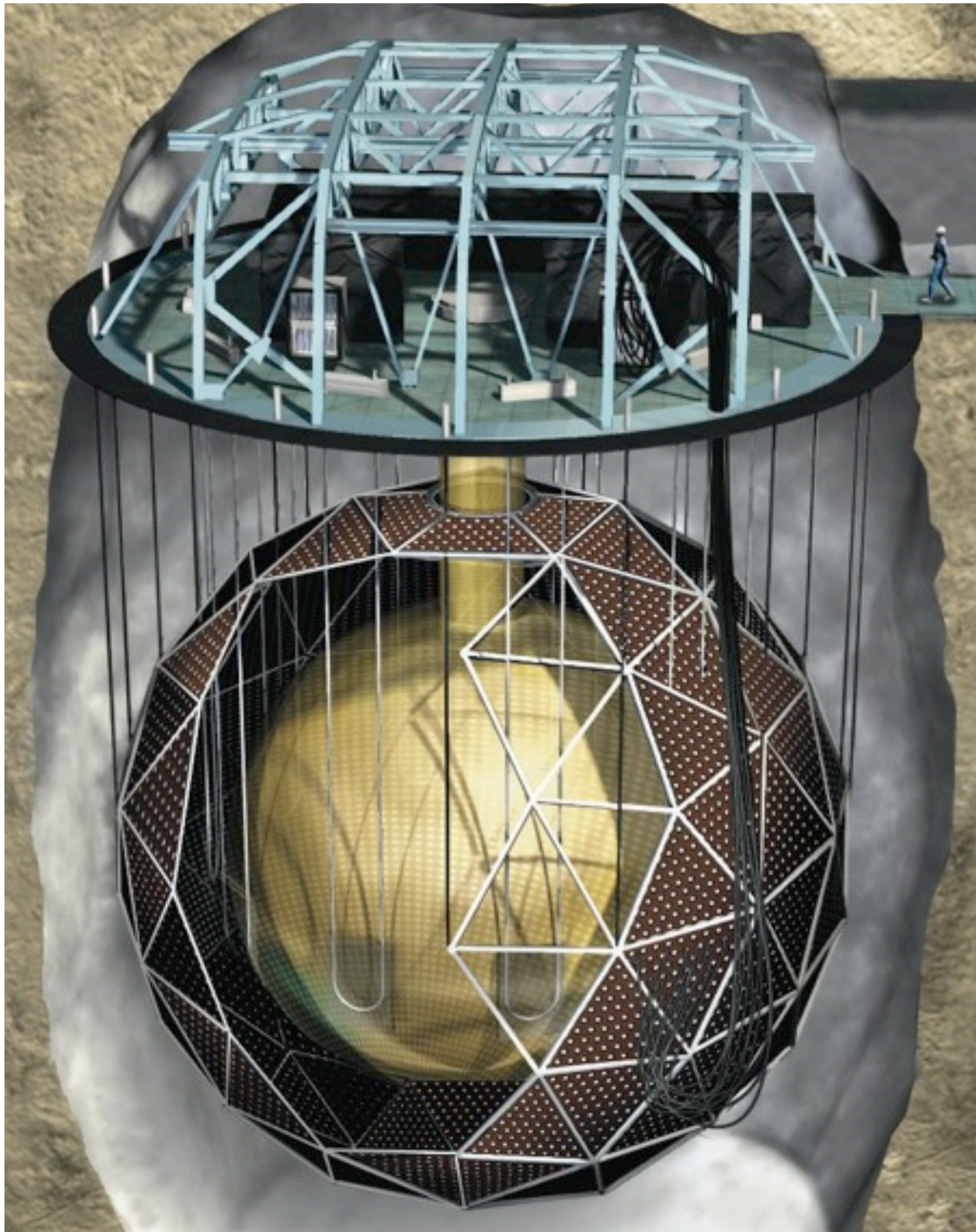
Technical University of Dresden

SNO successor

780 t of scintillator

1.7 & 5.3 kt ultra pure water shielding

9500 PMT’s



SNO successor

Sudbury, ON, Canada, 2070 m underground

SNO+ goals

Double-beta decay (S. Biller, Wed, 16.40)

Geo-neutrinos (M. Chen, Mon, 14.20)

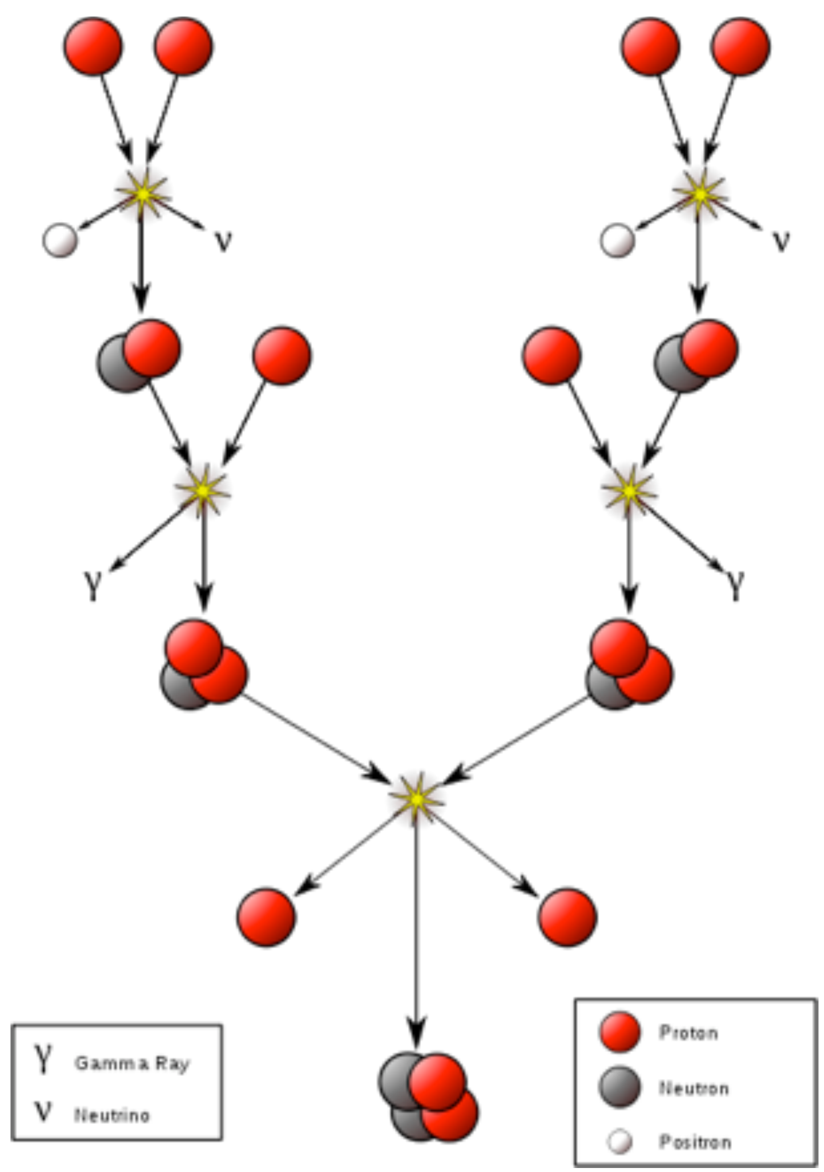
Reactor neutrinos

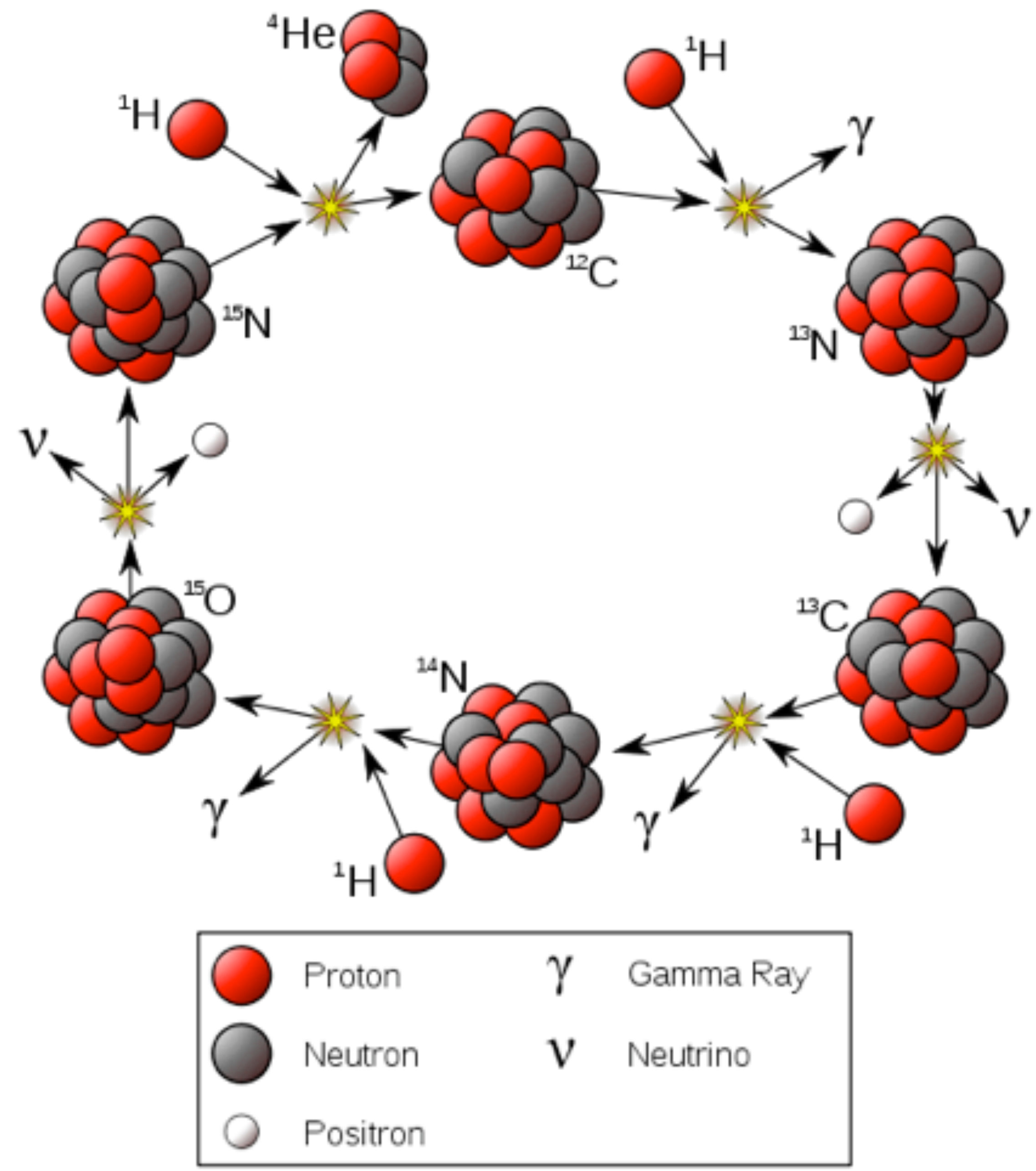
Supernova neutrinos

Hidden nucleon decay

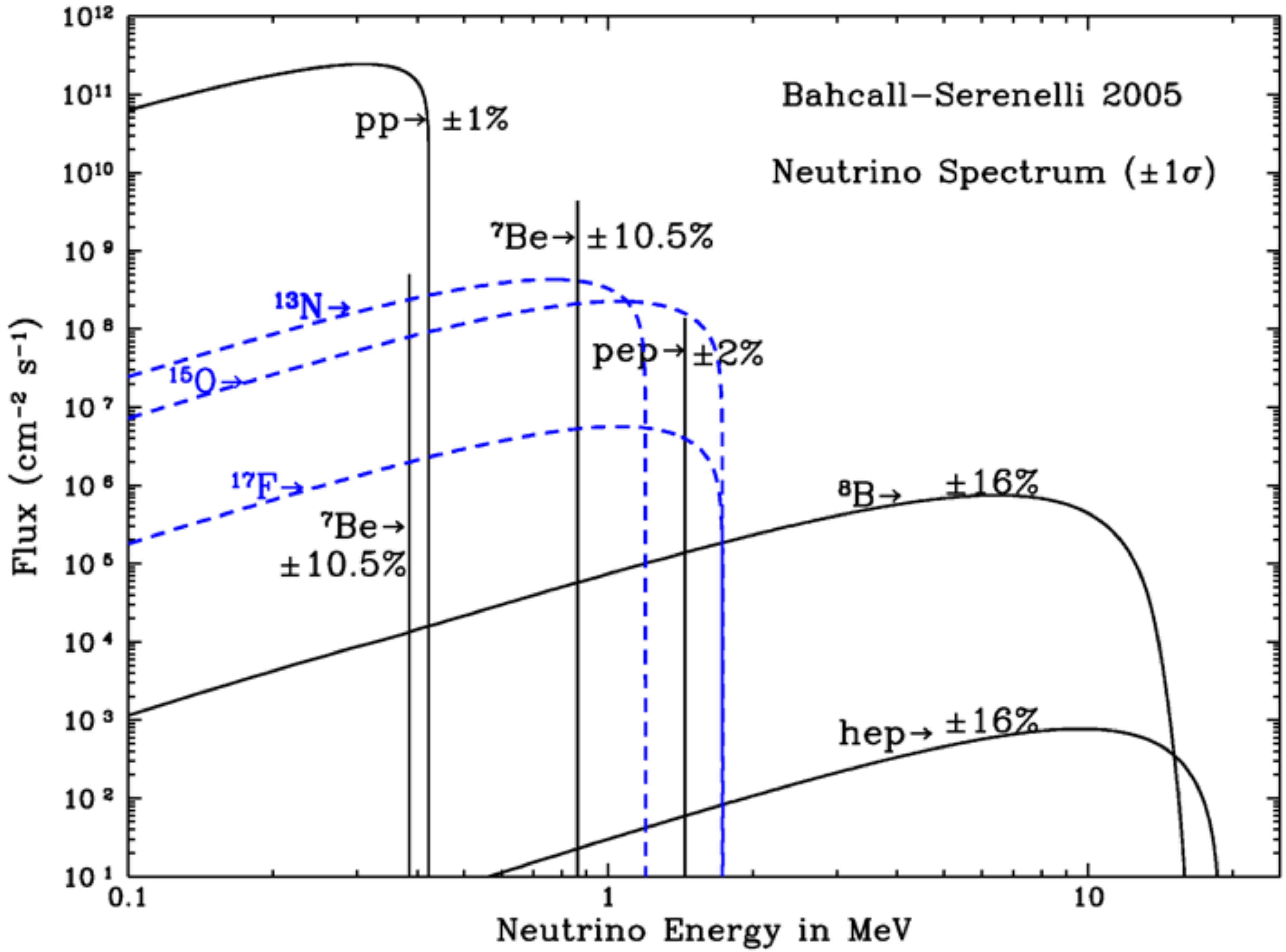
Low energy solar neutrinos

Solar neutrinos

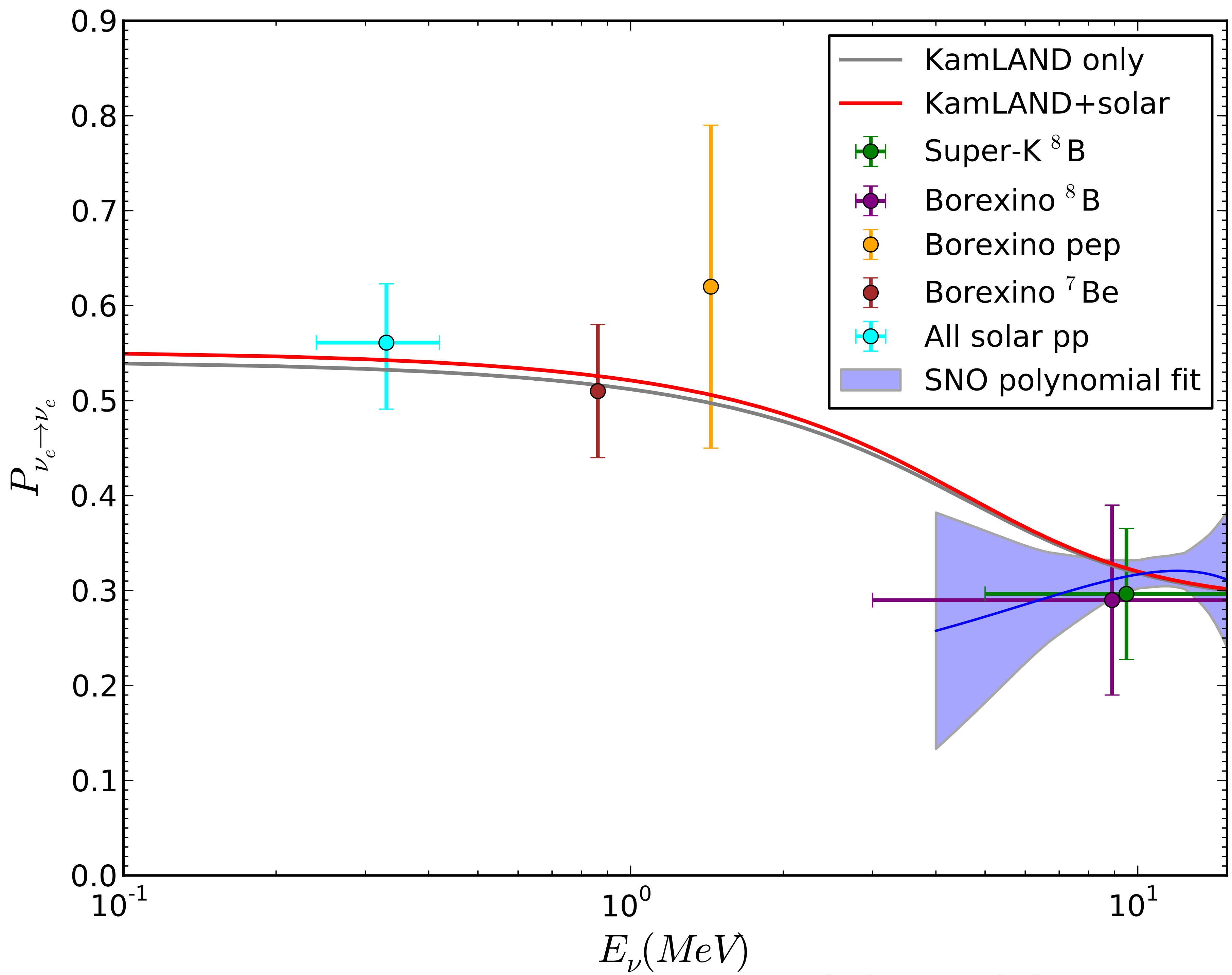




Energy spectrum

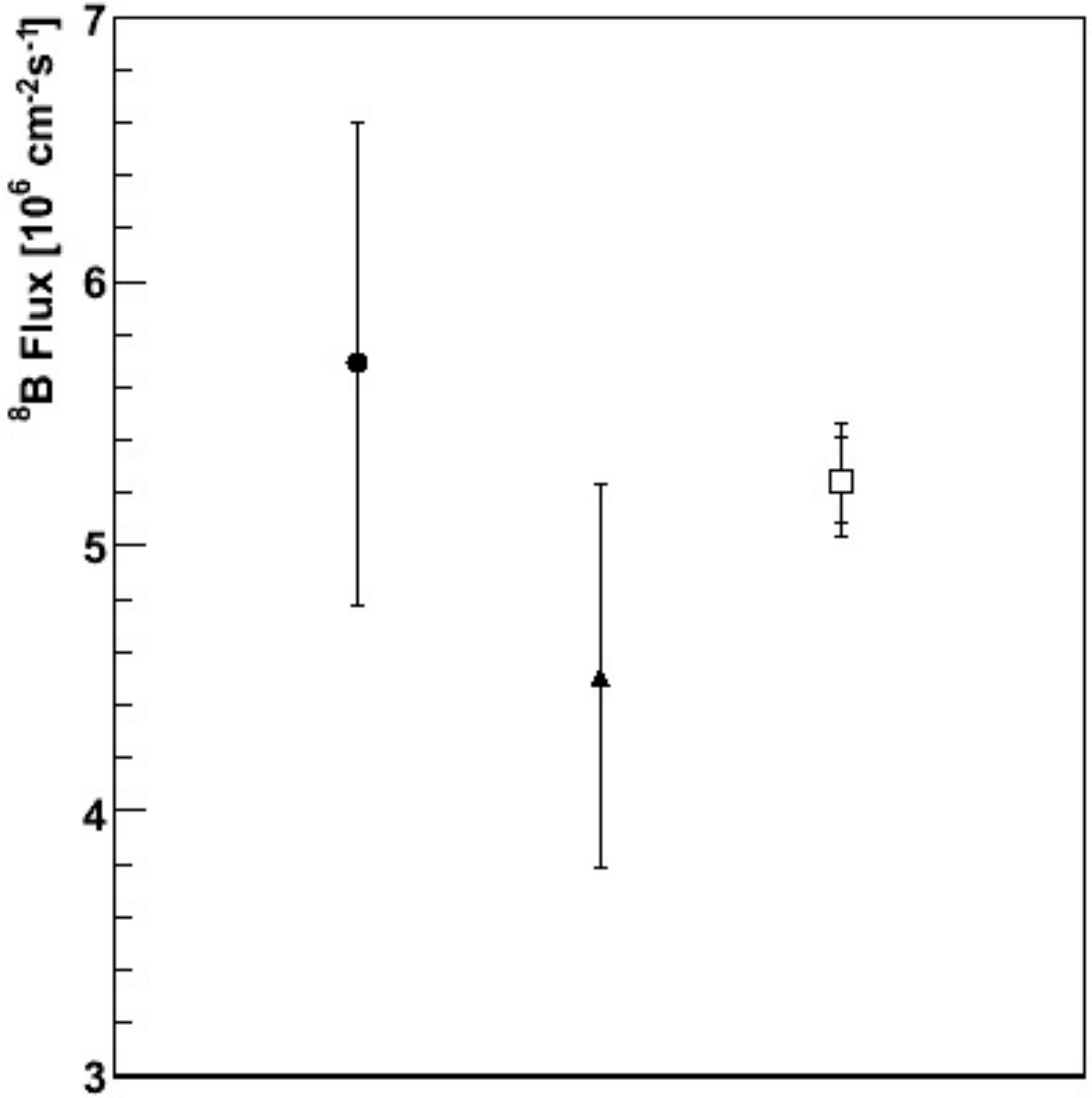


Survival probability

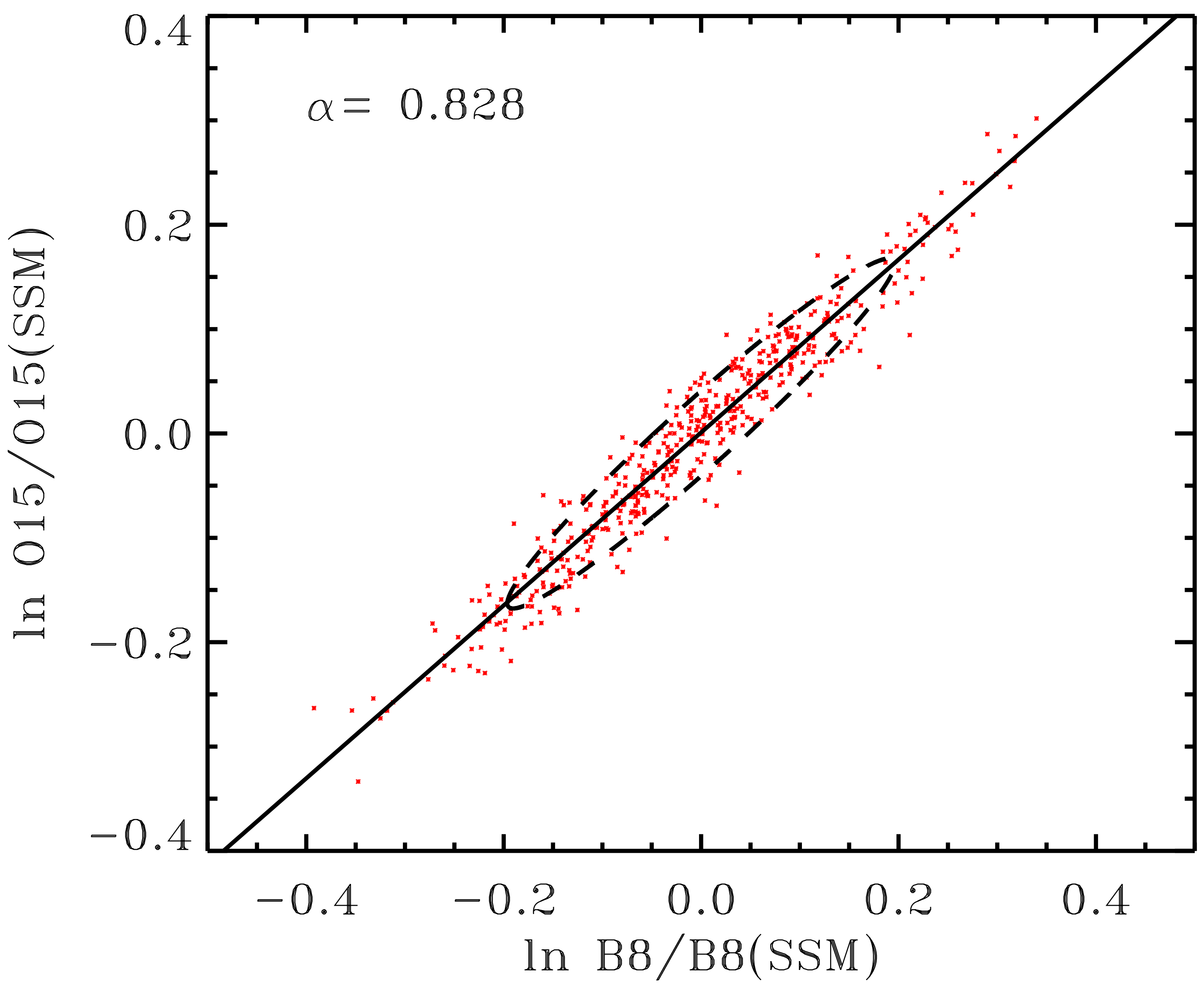


R. Bonventre, etal. 1305.5835

CNO neutrinos

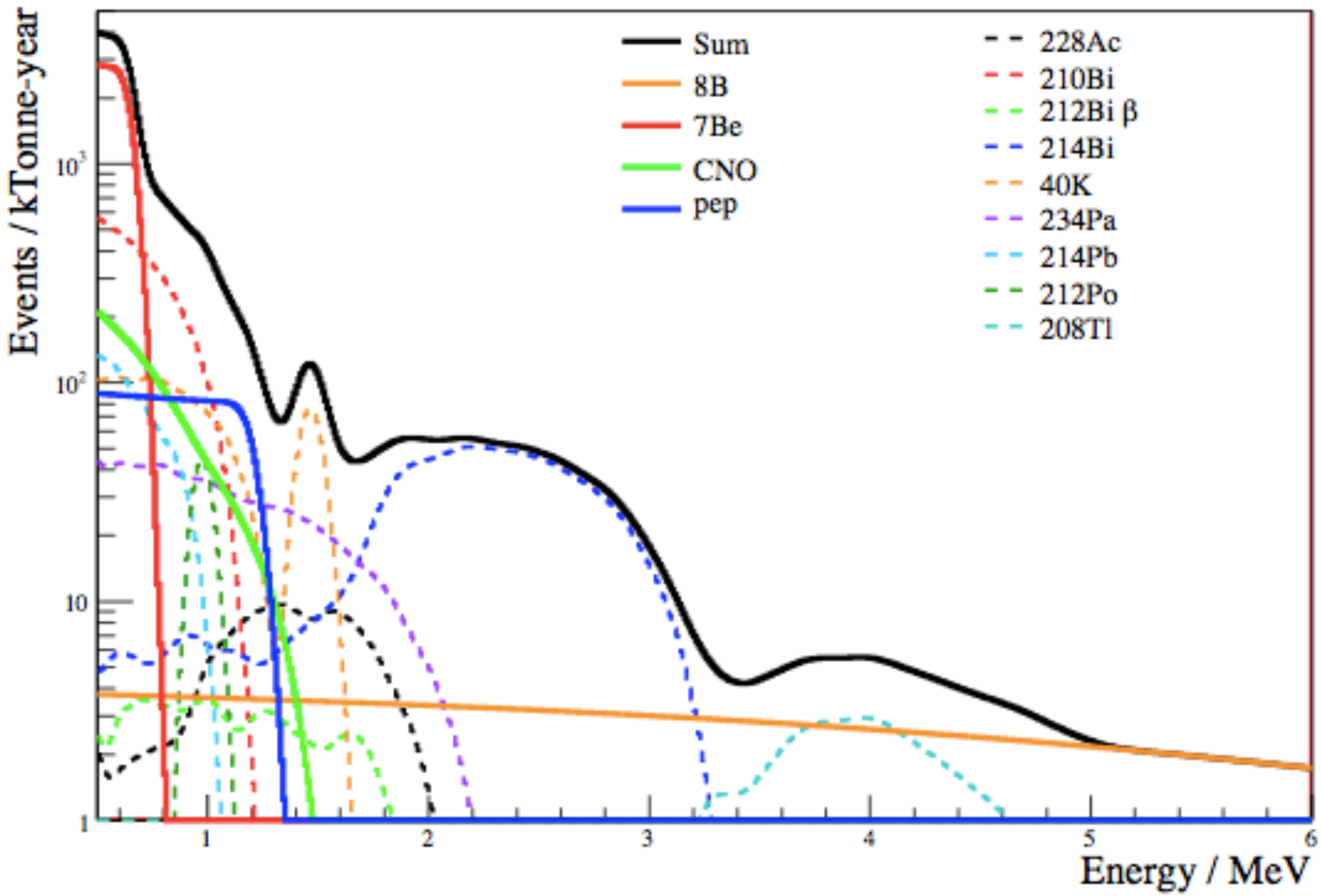


GS98
SNO
AGS05



Haxton, Serenelli. 0902.0036

SNO+ energy spectrum



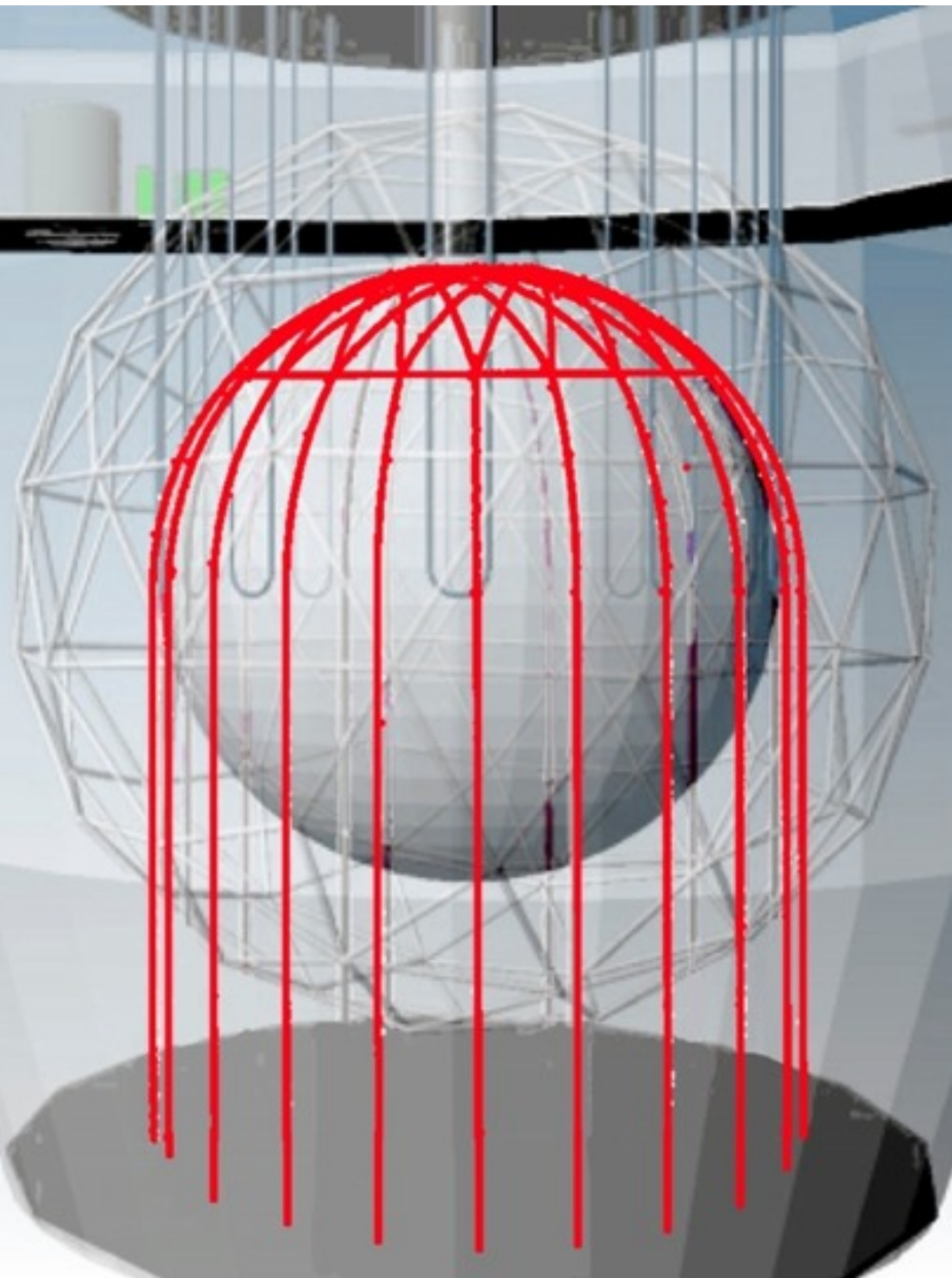
Precision flux measurement

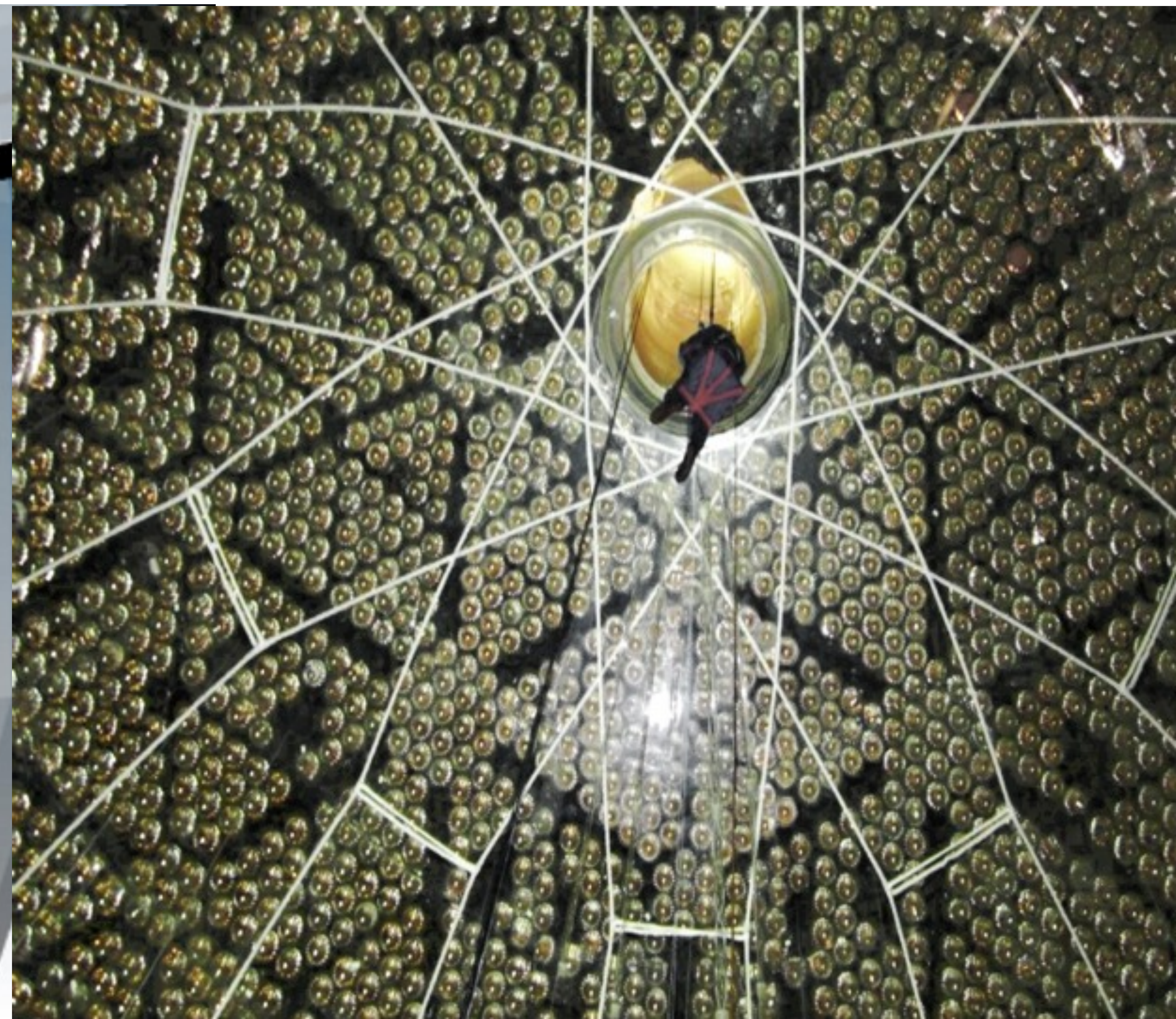
pep	9.1%
8B	7.5%
7Be	4%
CNO	~15 %
pp	a few %

1 year live-time, Borexino level backgrounds

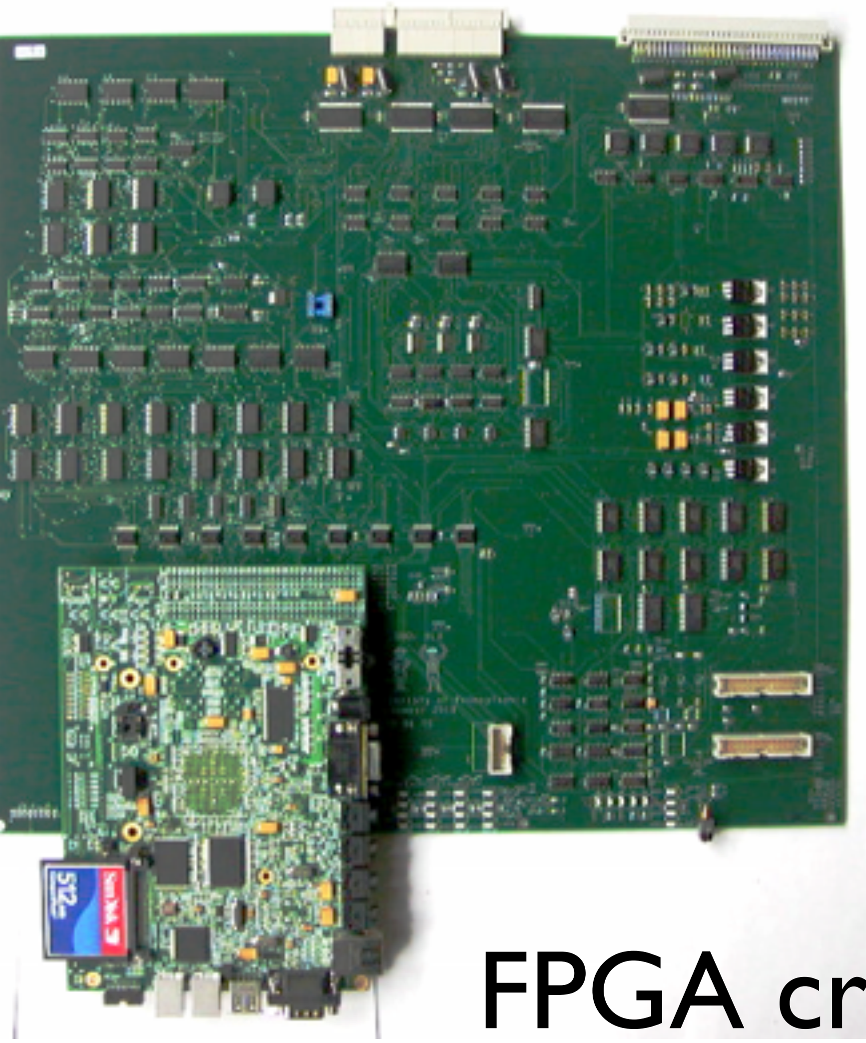
Fine-print disclaimer: see the back-up slide

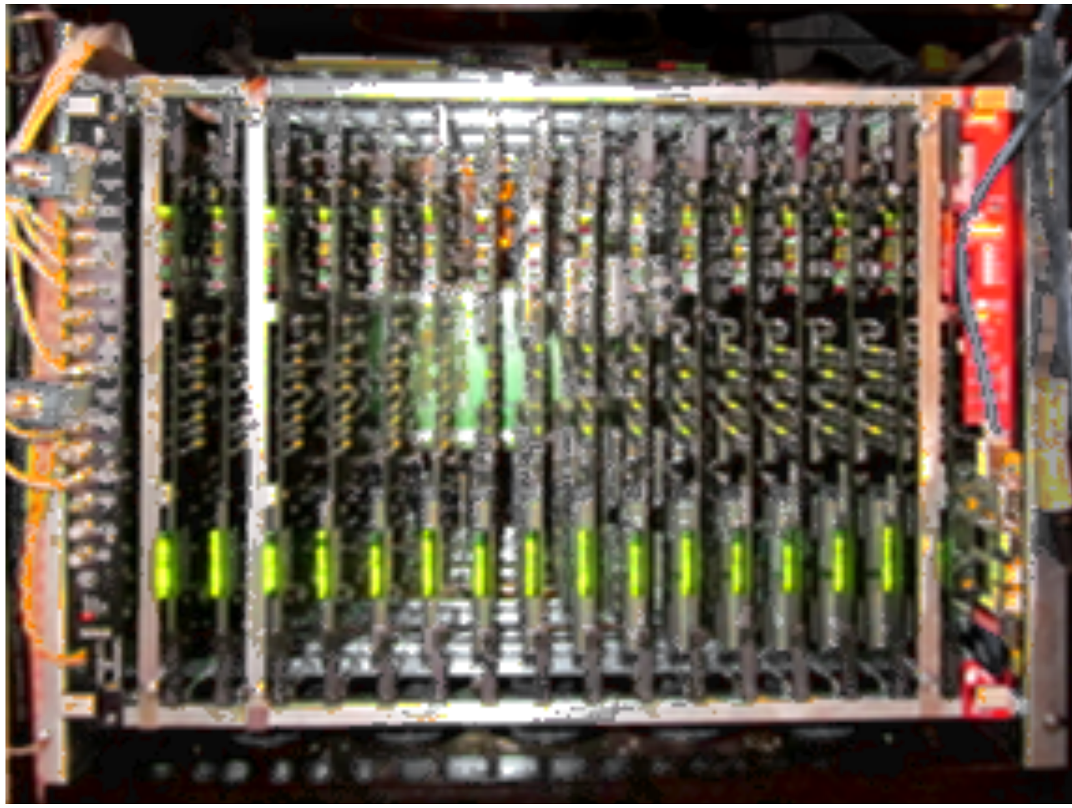
Hold-down rope net





Electronics upgraded



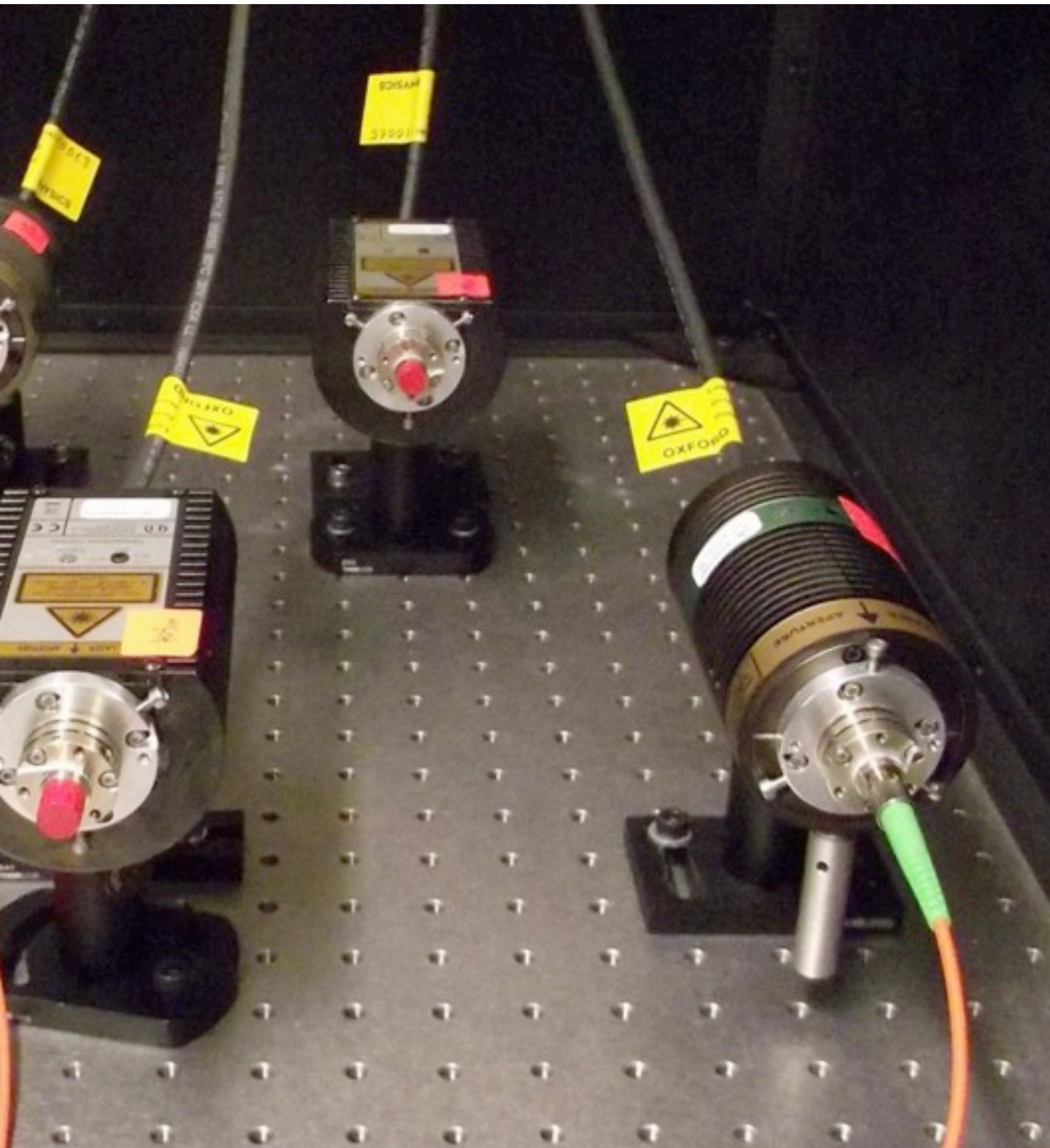


FPGA crate controllers, trigger system.

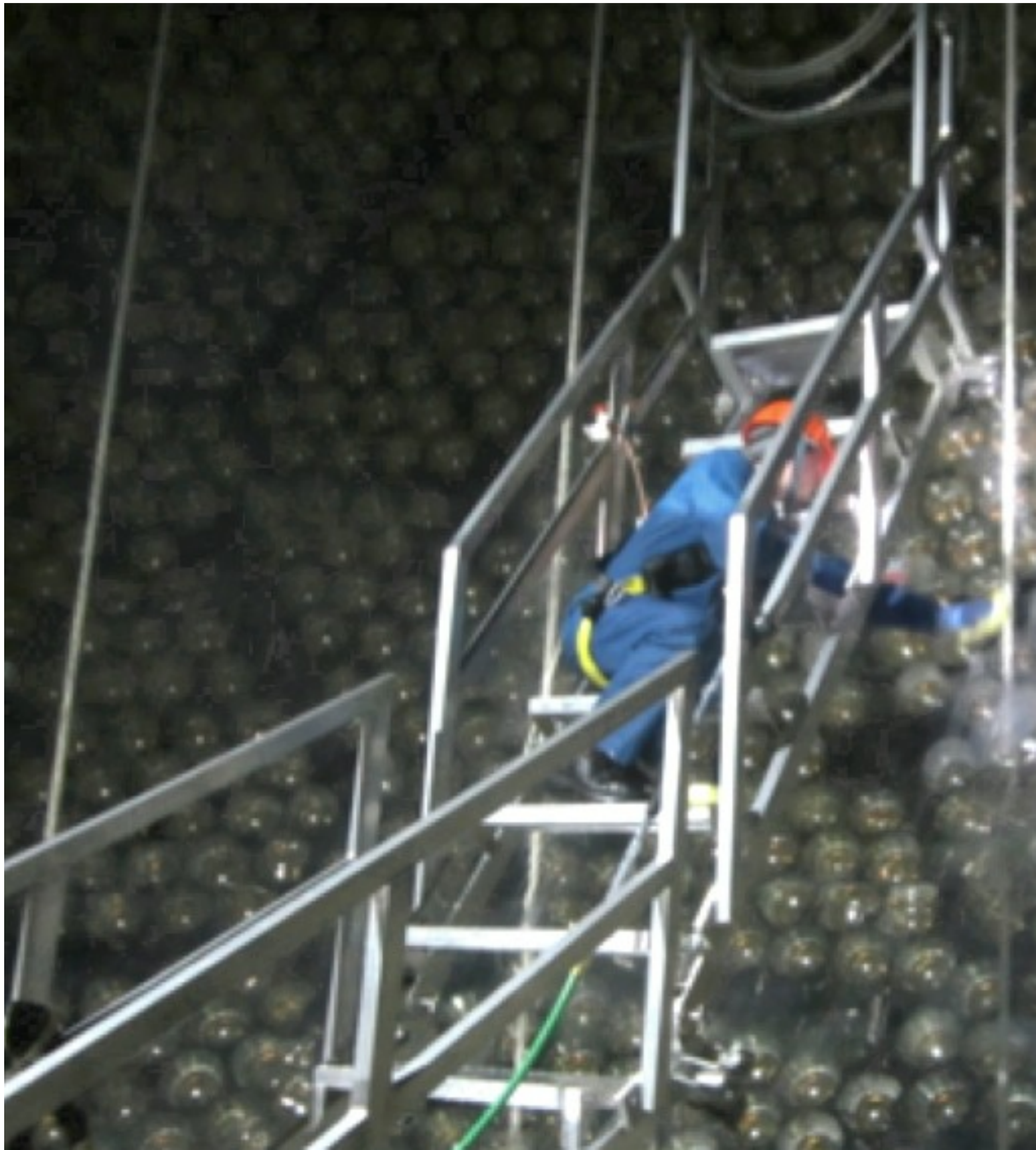
ORCA DAQ.

Demostrated data rate 450 MBit/sec.

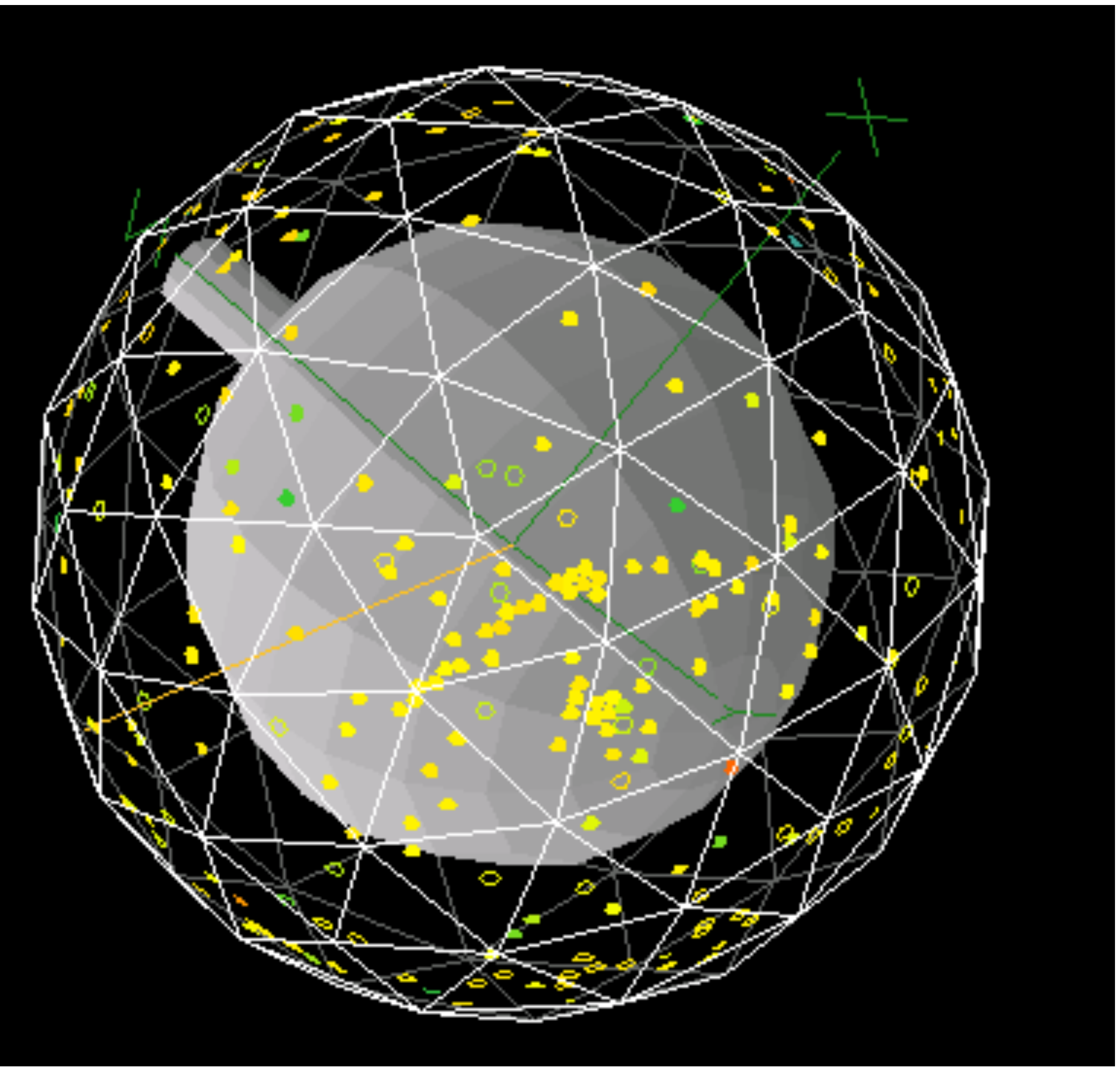
Calibration system

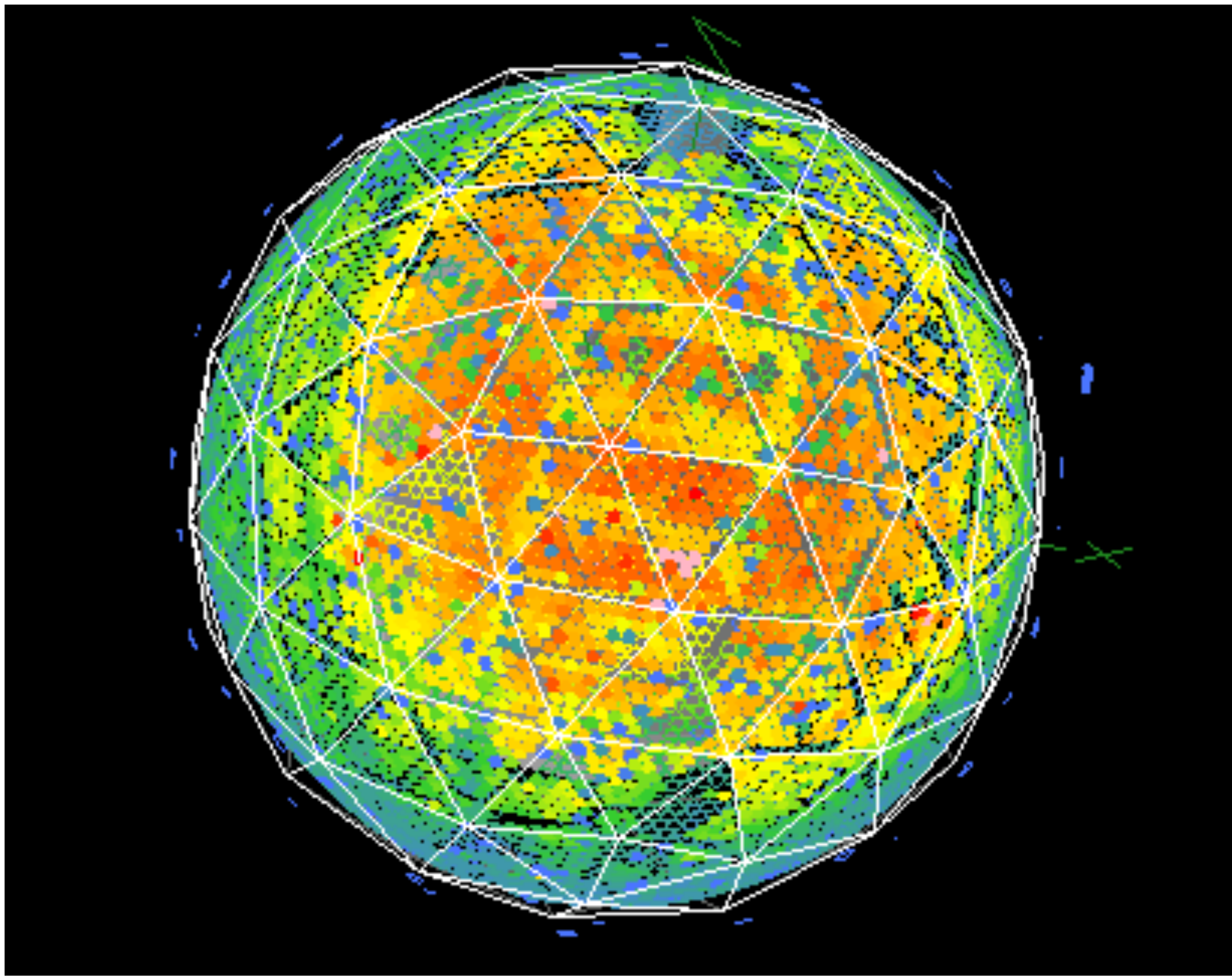


Acrylic vessel clean



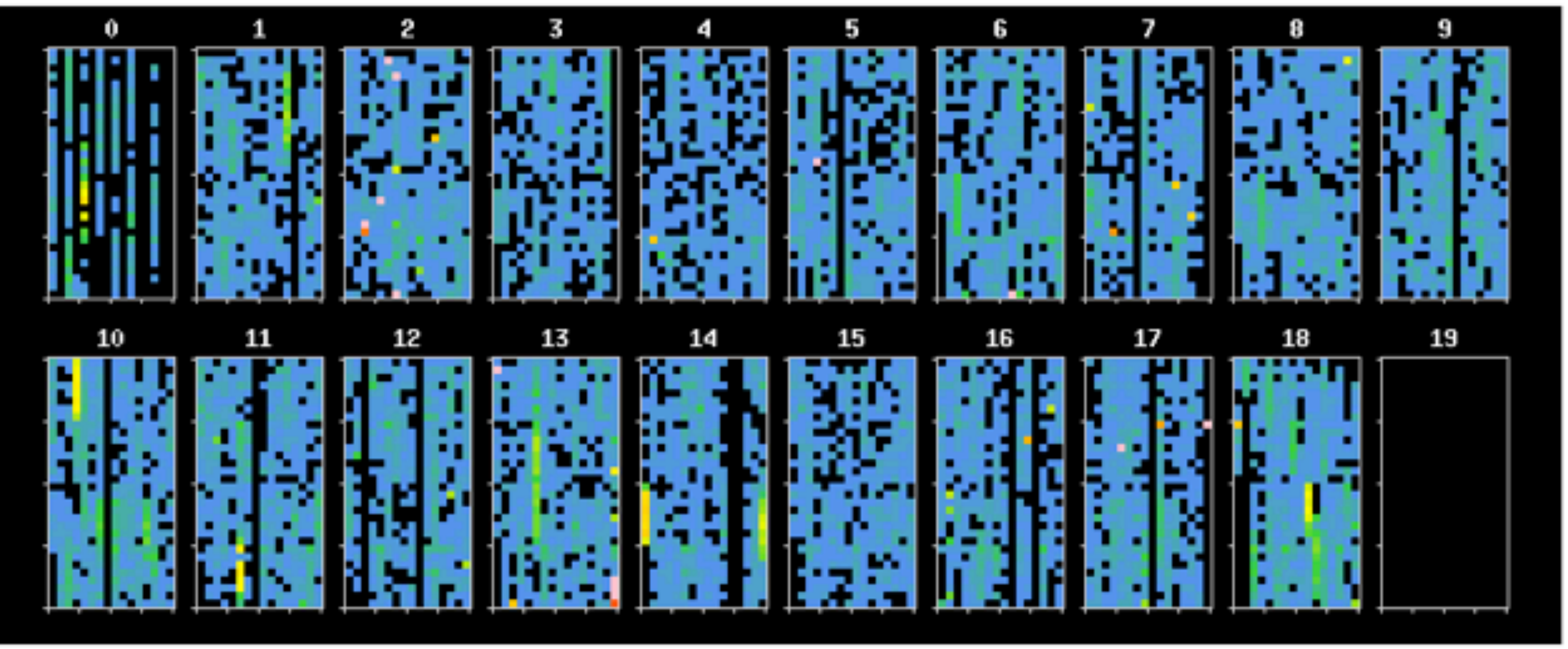
Air fill run fall 2012



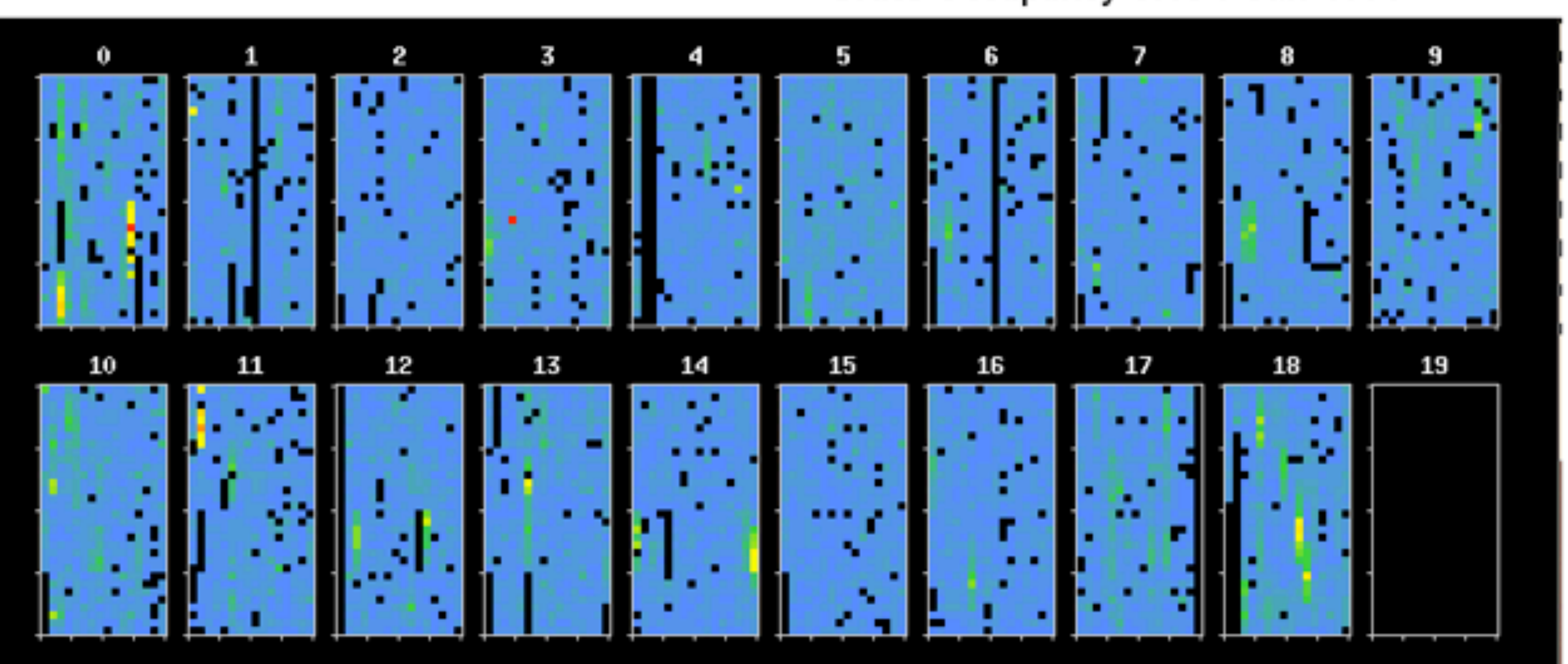


Air fill run fall 2012

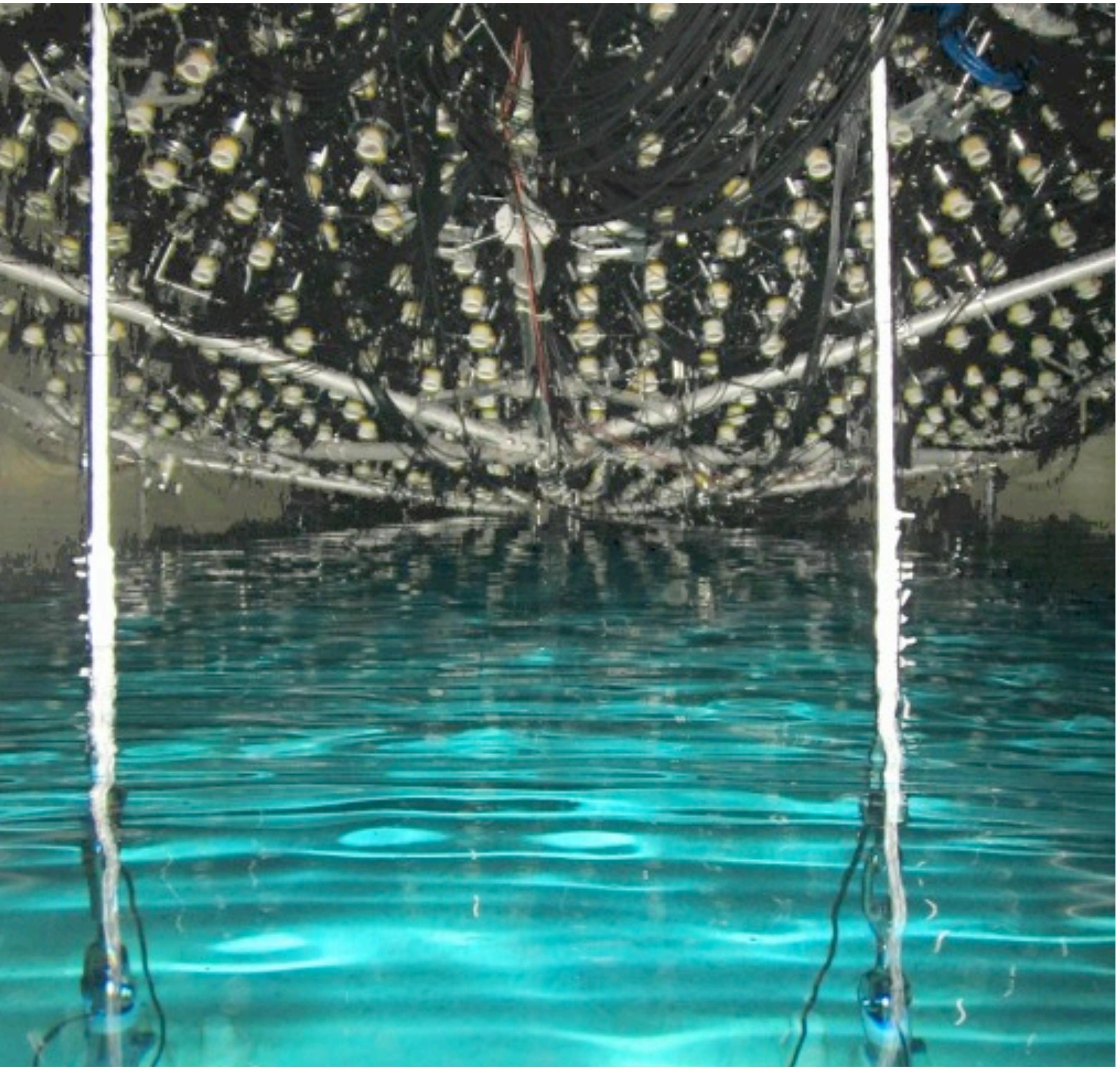
Crate Occupancy durin SNO NCD phase



Crate Occupancy SNO+ run 4096



Current status



SNO+ timeline

Water fill in fall 2013.

Water run in first half of 2014.

Scintillator transition later in 2014.

Full solar disclaimer

1. SNO+ has decided to prioritize neutrino-less 2β decay.
2. Radon daughters have accumulated on the surface of the AV over the last few years in a significant way. If these leach into the scintillator, the purification system has the capabil-ity to remove them.
3. However, depending on the actual leach rate, that removal might be inefficient and the ^{210}Bi levels in the scintillator too high for a pep/CNO solar neutrino measurement with-out further mitigation.
4. Mitigation could include enhancing online scintillator purification, draining the detector and sanding the AV surface to remove radon daughters, or deploying a bag.
5. Neutrino-less 2β and low−energy ^{8}B solar neutrino mea-surements are not affected by these backgrounds